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## **HVAC: Duct and Pipe Insulation**

### **Description**

This proposed measure would add a duct insulation section in the *Standards*, rather than just a reference to the CMC. The measure would also update both the duct and pipe insulation requirements to consider increases in R-value that are shown to be cost effective through life cycle cost analysis.

As a basis of the new section on duct insulation, this proposal would consider language and format from both Section 604 of the CMC and ASHRAE/IES Standard 90.1-2001. The ASHRAE/IES Standard 90.1-2001 section on duct insulation reads as follows:

**“6.2.4.1.2 Duct and Plenum Insulation.** All supply and return ducts and plenums installed as part of an HVAC air distribution system shall be thermally insulated in accordance with Tables 6.2.4.2A and 6.2.4.2B.

**Exceptions to 6.2.4.1.2:**

- (a) Factory-installed plenums, casings, or ductwork furnished as a part of HVAC equipment tested and rated in accordance with 6.2.1.
- (b) Ducts or plenums located in heated spaces, semi-heated spaces, or cooled spaces.
- (c) For runouts less than 10 ft in length to air terminals or air outlets, the rated R-value of insulation need not exceed R-3.5.
- (d) Backs of air outlets and outlet plenums exposed to unconditioned or indirectly conditioned spaces with face areas exceeding 5 ft<sup>2</sup> need not exceed R-2; those 5 ft<sup>2</sup> or smaller need not be insulated.”

The referenced tables are at the end of this document.

We propose to update both the tables from ASHRAE/IES Standard 90.1-2001 and the pipe insulation table in Title 24 (Table 1-G) using life cycle cost analysis and the current CEC economic criteria.

The CMC (§604, Table 6-D) presently has requirements for duct insulation that are expected to be different from the upgraded requirements determined to be cost effective for the 2005 *Standards*. If enough time exists, it would be desirable for the CMC levels to be changed to the same levels.

### **Benefits**

Duct and pipe insulation reduce energy use by decreasing system distribution losses. These losses occur at all times, both on and off peak. Consideration of TDV will likely increase the stringency of these requirements.

### **Environmental Impact**

These measures will reduce both gas and electric energy use. The revised analysis is likely to produce a more stringent standard, requiring greater amounts of insulation to be used in buildings.

### **Type of Change**

These changes are mandatory requirements. Duct insulation is presently covered in §124 of the *Standards*, and pipe insulation is addressed in §123. No changes are necessary for either the compliance forms or ACM. Changes will be required in the Nonresidential Compliance Manual.

### **Measure Availability and Cost**

Several major manufacturers of duct and pipe insulation exist. In such a well-developed marketplace, existing products will likely meet any new requirements.

### **Useful Life, Persistence and Maintenance**

In the AB 970 Standard, measures for protection of pipe and duct insulation were incorporated specifically to improve the persistence of these measures. These provisions will be reviewed to insure that they cover

all acceptable protection approaches. Proposed increases in the duct and pipe insulation levels are not expected to affect the persistence or maintenance of the insulation.

#### Performance Verification

N/A.

#### Cost Effectiveness

A life cycle cost study, similar to that used in the evaluation of duct and pipe insulation for ASHRAE/IES Standard 90.1-1999, will be repeated for these measures using California utility costs and current cost data for insulation products. New research on insulation costs will have to be performed.

#### Analysis Tools

The ASHRAE/IES Standard 90.1-1999 study was a spreadsheet analysis.

#### Relationship to Other Measures

N/A.

#### Bibliography and Other Research

ASHRAE/IES Standard 90.1-1999 and 2001.